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A device for cleaning the teats of an animal

BACKGROUND OF THE INVENTION AND PRIOR ART

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The present invention refers to a device for cleaning the teats of an animal, including a first conduit member and a teat-cleaning member, which via the first conduit member is connectable to a central arrangement for supplying cleaning
15 liquid and discharging waste liquid.

Such teat-cleaning devices are known for cleaning the teats of an animal to be milked before a milking operation and possibly after a milking operation. Such a cleaning before
20 the milking operation has several purposes. A first purpose is to clean the teat in order to prevent dirt, micro-organisms or other particles from reaching the milk to be delivered. A second purpose is to massage the teat in order to make the animal prepared for the milking operation so
25 that the milk can be extracted from the teat in an easy manner. A third purpose is to extract the so-called fore-milk, which is the first small quantity of milk. This quantity of milk has a poor quality and is therefore not suitable to be delivered from the farm.

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WO01/17337 discloses such a teat-cleaning device, which include a single teat-cleaning cup to be attached to a teat to be cleaned. The teat-cleaning cup is connected to a central arrangement for supplying a cleaning liquid into an
35 inner space of the teat-cleaning cup and for discharging waste liquid from the inner space of the teat-cleaning cup

by means of the application of a low, sub-atmospheric pressure. The teat-cleaning device disclosed in WO01/17337 is intended for being used together with an automatic handling device for the attachment of the teat-cleaning cups and the teatcups to the teats of the animal. During a cleaning operation the known teat-cleaning cup is moved successively from one teat to another for cleaning of the respective teats. In a milking stall with manual attachment of the teatcups, the cleaning operation is normally performed completely without the use of any particular cleaning equipment.

However, the manual cleaning operations according to the prior art are time-consuming and require a significant labour effort from the milker. The milker has to clean the teats successively. During cleaning of an individual teat, the milker has to take a very tiring position, which is unfavourable from an ergonomic point of view.

20 SUMMARY OF THE INVENTION

The object of the present invention is to remedy the problems mentioned above and to provide a teat-cleaning device, which is operable in a convenient manner and in such a way that the efforts to be made by the milker are small.

This object is obtained by the device initially defined, which is characterised in that the teat-cleaning member includes at least two teat-cleaning cups to be applied to a respective teat of the animal, a conduit assembly and two second conduit members extending between a respective one of the teat-cleaning cups and the conduit assembly, and that each teat-cleaning cup is connected to the central arrangement via the respective second conduit member and the first conduit member for said supply of cleaning liquid and said discharge of waste liquid.

By means of such a device the teat-cleaning member may easily be attached to all the teats of the animal and the cleaning operation may be performed simultaneously for all the teats. Consequently, the time required for cleaning operation of an animal may be significantly reduced in comparison with the prior art where the teats of an animal are cleaned successively.

10 According to an embodiment of the invention, the central arrangement is arranged to discharge the waste liquid by applying a pressure significantly lower than the atmospheric pressure to the teat-cleaning cups via the conduit members. By means of such a sub-atmospheric pressure, which may be
15 obtained by means of a vacuum pump, the waste liquid can be withdrawn in an efficient manner from the teat-cleaning cups. Moreover, thanks to the application of the sub-atmospheric pressure the teat-cleaning cups may also be retained on the teats during the cleaning operation so that
20 the milker does not need to hold the teat-cleaning cups during the cleaning operation. A further advantage of the sub-atmospheric pressure is that the first quantity of milk, i.e. the so-called fore-milk may be extracted from the teat and transported away from the teat-cleaning cup.

25 According to a further embodiment of the invention, each conduit member includes a supply conduit for the supply of the cleaning liquid to said teat-cleaning cup, and a discharge conduit for the discharge of waste liquid from
30 said teat-cleaning cup. Thus, mixing of any quantity of the supply liquid and the waste liquid can be avoided. Preferably, the central arrangement is then arranged to perform the supply of cleaning liquid and the discharge of waste liquid simultaneously. Thus a continuous flow of
35 liquid through the inner space of the teat-cleaning cup is created. In order to permit such flow an air inlet opening

may be provided between the surroundings and the inner space of the teat-cleaning cups, or between the surroundings and any one of the conduit members in the proximity of the teat-cleaning cup.

5 According to a further embodiment of the invention, the conduit assembly includes a connection member, which connects each second conduit member to the first conduit member. The supply conduit of each second conduit member may
10 then be connected to the supply conduit of the first conduit member, wherein the discharge conduit of each second conduit member is connected to the discharge conduit of the first conduit member.

15 According to another embodiment of the invention, the conduit assembly includes a connection member arranged to hold the conduit members together. Such a connection member may be realised as a band or ring-shaped member extending around the bundle of conduit members.

20 According to a further embodiment of the invention, the teat-cleaning member includes a casing enclosing the connection member and having a first opening for the passage of the first conduit member and at least two second openings
25 for the passage of a respective one of the second conduit members. By means of such a casing the teat-cleaning member is easy and convenient to handle. Advantageously, each second conduit member may be relatively rigid permitting the second conduit member and the associated teat-cleaning cup
30 to extend in an upward direction. Such rigidity facilitates the attachment of the teat-cleaning cups to the teats. This design is advantageous together with said casing.

35 According to a further embodiment of the invention, the teat-cleaning member includes a grip member, permitting holding of the teat-cleaning member. Advantageously, the

grip member may be provided on the casing to be engaged by a wire-like member, for instance.

According to a further embodiment of the invention, the device includes a carrying arrangement for carrying the teat-cleaning member to be movable at least between an inactive position beside the animal to be cleaned and an active position beneath the teats of the animal. Moreover, the carrying arrangement may permit the teat-cleaning member to be transported between different milking positions in a milking stall, so that the teat-cleaning device according to the invention may serve several milking positions. Advantageously, the carrying arrangement may include at least one rail and a carriage movable along the rail, wherein the teat-cleaning member may be suspended in the carriage via a wire-like member. Such a rail and carriage permit the teat-cleaning member to be moved horizontally. The carrying arrangement may also include at least one holding member for holding the first conduit member along the wire-like member and the carriage. Thus the first conduit member may extend substantially vertically along the wire-like member, wherein the first conduit member is removed from the area where the milker is present. Advantageously, said holding member may form an open passage through which the first conduit member is movable, permitting the first conduit member to slide in the holding member along carriage and possibly also the wire-like member when the latter is raised or lowered.

According to a further embodiment of the invention, the device includes a balancing member enabling the teat-cleaning member to be raised and lowered by the application of a force smaller than the gravity force of the teat-cleaning member proper. Consequently, the milker may move the teat-cleaning member vertically in a convenient manner. Advantageously, the balancing member may be provided on the

carriage. Furthermore, the balancing member may be arranged to collect the wire-like member, for instance the wire-like member may be wound on a reel or the like, which may be provided in the carriage.

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According to a further embodiment of the invention each teat-cleaning cup includes a lower end, an upper end and an inner space, the upper end defining an opening for the introduction of the teat to be cleaned into the inner space.

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Moreover, each teat-cleaning cup may include a flexible lip extending around the opening and inwardly towards a centre of the opening in order to abut tightly the teat introduced into the inner space of the teat-cleaning cup. By means of such a lip, uncontrolled air leakage from the surroundings

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into the inner space can be prevented and thus a secure attachment of the teat-cleaning cup onto the respective teat is obtained. Advantageously, the lip slopes downwards towards the centre of the opening. Such an downwardly, inwardly inclined lip will prevent the teat-cleaning cup

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from falling off the teat, since the sub-atmospheric pressure in the inner space, thanks to this design of the lip, will tend to pull the teat into the inner space.

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According to a further embodiment of the invention, the teat-cleaning device includes a retracting member arranged for retracting the teat-cleaning member from the teats of the animal after the cleaning operation is finished. By means of such a retracting member the teat-cleaning member does not need to be manually removal from the teats.

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BRIEF DESCRIPTION OF THE DRAWINGS

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The present invention will now be described more closely by means of various embodiments thereof and with reference to the drawings attached hereto.

- Fig 1 discloses schematically a view of a teat-cleaning device according to an embodiment of the present invention.
- Fig 2 discloses a side-view of the device in Fig 1.
- 5 Fig 3 discloses another side-view the device in Fig 1.
- Fig 4 discloses a view from above of the device in Fig 1.
- Fig 5 discloses schematically a connection member of the device in Fig 1.
- 10 Fig 6 discloses a teat-cleaning cup of the device in Fig 1.
- Fig 7 discloses a view of the teat-cleaning device in Fig 1 in two different positions.

15 DETAILED DESCRIPTION OF VARIOUS EMBODIMENTS OF THE INVENTION

Fig 1 discloses a teat-cleaning device according to an embodiment of the present invention. The teat-cleaning device is intended to be arranged in a milking stall for cleaning the teats of the animals to be milked. The teat-cleaning device includes a first conduit member 1 and a teat-cleaning member 2. The teat-cleaning member 2 is, via the first conduit member 1, connected to a central arrangement 3, schematically disclosed in Fig 1, for supplying cleaning liquid to the teat-cleaning member 2 from a cleaning liquid tank 3' and for discharging waste liquid from the teat-cleaning member 2 to a waste tank 3''.

30 The teat-cleaning member 2 includes, in the embodiment described, four teat-cleaning cups 5, two of which are disclosed in Fig 1. The teat-cleaning cups 5 are attachable to a respective teat of the animal. It is to be noted that the teat-cleaning device according to the present invention is applicable to all animals that can be milked, such as cows, buffaloes, horses, sheep, goats, etc. Depending on the

number of teats of the animal to be cleaned, the teat-cleaning device can include not only four teat-cleaning cups but any other number, e.g. two.

5 The teat-cleaning member 2 also includes a conduit assembly 6, for instance including a connection member 6', an example of which is schematically disclosed in Fig 5. Furthermore, the teat-cleaning device includes two second conduit members 7 extending between a respective one of the teat-cleaning
10 cups 5 and the connection member 6'. Each teat-cleaning cup 5 is hence connected to the central arrangement 3 via the respective second conduit member 7 and the first conduit member 1 for the supply of said cleaning liquid and the discharge of said waste liquid. The cleaning liquid is the
15 liquid, which is supplied for the cleaning of the teat, whereas the waste liquid is the liquid, which after the cleaning is discharged from the teat-cleaning cup 2. The central arrangement 3 is arranged to discharge the waste liquid by the application of a pressure significantly lower
20 than the atmospheric pressure, i.e. a sub-atmospheric pressure, to the teat-cleaning cups 5 via the first conduit member 1 and the second conduit members 7. To this end, the central arrangement 3 may include or be connected to a vacuum source, for instance a vacuum pump, schematically
25 indicated at 4, sucking the waste liquid from the teat-cleaning cups 5.

The first conduit member 1 includes a first supply conduit 11 for said supply of cleaning liquid, and a first discharge
30 conduit 12 for the discharge of waste liquid. Each second conduit member 7 includes a second supply conduit 13 for said supply of cleaning liquid, and a second discharge conduit 14 for the discharge of waste liquid. Consequently, the central arrangement 3 can perform the supply of cleaning
35 liquid to the teat-cleaning cups 5 and the discharge of waste liquid from the teat-cleaning cups 5 simultaneously.

In the embodiment disclosed, the second supply conduit 13 of each second conduit member 7 is connected to the first supply conduit 11 of the first conduit member 1, and the second discharge conduit 14 of each second conduit member 7 is connected to the first discharge conduit 12 of the first conduit member 1. It is to be noted that the second conduit member 7 also may include two second supply conduits 13 for each teat-cleaning cup 5, for the supply of cleaning liquid, or cleaning liquid and air or any other suitable gas. The two supply conduits 13 may be arranged to supply cleaning liquid and air in alternating manner.

To this end the connection member 6' disclosed in Fig 5 includes two parts, a supply part for the connection of the supply conduits 11, 13 and a discharge part for the connection of the discharge conduits 12, 14. The supply part includes an inner space 16, an inlet nozzle 17 communicating with the inner space 16 and four outlet nozzles 18 communicating with the inlet space 16. The inlet nozzle 17 is connectable to the first supply conduit 11. The outlet nozzles 18 are connectable to a respective second supply conduit 13. The discharge part includes an inner space 19, an outlet nozzle 20 communicating with the inner space 19 and four inlet nozzles 21 communicating with the inlet space 19. The outlet nozzle 20 is connectable to the first discharge conduit 12. The inlet nozzles 21 are connectable to a respective second discharge conduit 14.

The teat-cleaning member 2 also includes a casing 30, which is disclosed in Figs 2-4 and which encloses the connection member 6'. The casing 30 has a first opening 31 for the passage of the first conduit member 1 and four second openings 32 for the passage of a respective one of the four second conduit members 7. It is to be noted that the positions of the inlet and outlet nozzles 17, 18, 20, 21 of the connection member 6' disclosed in Fig 5 have not been

adapted to the shape of the casing 30 and the positions of the openings 31, 32. Each second conduit member 7 is relatively rigid. Such rigidity may be obtained by producing at least one of the second supply conduit 13 and the second discharge conduit 14 in a relatively rigid material. Such rigidity permit the second conduit members 7 and the associated teat-cleaning cup 5 to extend upwardly in a substantially vertical, upward direction x or a slightly inclined upward direction from the connection member 6' or from the casing 30.

Moreover, the teat-cleaning member 2 includes a grip member 33 permitting gripping and holding of the teat-cleaning member 2. In the embodiment disclosed, the grip member 33 is provided on top of the casing 30 and has the shape of a ring. The teat-cleaning member 2 also includes a handle 34, which in the embodiment disclosed is attached to the casing 30 on the lower side thereof, and which permits manual gripping of the teat-cleaning member 2.

The teat-cleaning device includes a carrying arrangement 40 for carrying the teat-cleaning member 2 in such manner that the teat-cleaning member 2 is movable horizontally and vertically at least between an inactive position beside A the animal to be cleaned and an active position B beneath the teats of the animal, see Fig 7. The carrying arrangement 40 also permits the teat-cleaning member 2 to be moved or transported between different milking positions in the milking stall. Each different milking position may be arranged to house a respective animal to be milked according to any suitable milking stall layout. The carrying arrangement 40 includes at least one rail 41 and a carriage 42, which is movable along the rail 41 by means of rotating wheels 43. The teat-cleaning member 2 is suspended in the carriage 42 via a wire-like member 44, e.g. in the form of a line, a rope, a wire or a chain, which is attached to the

grip member 33. The carrying arrangement 40 includes at least one holding member 46 for holding the first conduit member 1 along the wire-like member 44 and the carriage 42. The holding member 46 forms an open passage through which the first conduit member 1 is movable. In the embodiment disclosed, only one holding member 46 in the form of a pulley arranged on the carriage 42 is provided, although the carrying arrangement 40 may include several carrying members of various kind and arranged along the extension of the first conduit member 1 from the teat-cleaning member 2 to the central arrangement 3. It is also to be noted that the carrying arrangement 40 may include more than only one rail for the transport of the carriage 42 and the teat-cleaning member 2 depending on the layout of the milking stall in which the teat-cleaning device is provided.

Furthermore, the teat-cleaning device includes a balancing member 48, which enables raising and lowering of the teat-cleaning member 2 by the application of a manual force that is significantly smaller than the gravity force of the teat-cleaning member 2 proper. The balancing member 48 is provided on the carriage 42. The balancing member 48 is only schematically disclosed in Fig 1 and exemplified as a reel-like member arranged to collect the wire-like member 44. Such a reel-like member may for instance be biased by means of a spring (not disclosed) balancing the gravity force of the teat-cleaning member 2. The balancing member 48 may also be in the form of a pulley, wherein the wire-like member 44 extends around the pulley and is attached to a weight balancing the gravity force of the teat-cleaning member 2. The weight is indicated at 49 by dotted lines in Fig 1.

Fig 6 discloses more closely an example of a teat-cleaning cup 5 of the teat-cleaning device according to the invention. Each teat-cleaning cup 5 includes a shell 51, a lower end 52, an upper end 53 and an inner space 54 for

receiving a teat to be cleaned. The upper end 52 defines an opening 55 for the introduction of the teat into the inner space 54. At the outer periphery of the inner space 54 but inside the shell 51, two supply channels 56 are arranged for
5 ejecting the supply liquid into the inner space via a plurality of small nozzles 57. The supply channels 56 are both connected to the second supply conduit 13. The inner space 54 is connected to the second discharge conduit 14 for
10 the discharge of the waste liquid. A small air inlet 58 is provided at the lower end 52, for instance, for improving the suction effect of the vacuum pump, and thus the flow of the supply liquid and waste liquid through the teat-cleaning cup 5.

15 Each teat-cleaning cup 5 includes a flexible lip 60 extending around the opening 55 and inwardly towards a centre of the opening 55 in order to abut tightly the teat introduced into the inner space 54. The lip 60 also slopes downwards towards the centre of the opening 55 and towards
20 the inner space 54. The lip 60 forms in the embodiment disclosed a part of a cover member 61, which is removably arranged on top of the teat-cleaning cup 5. The cover 61 and thus the lip 60 are manufactured in flexible, preferably rubber-like material.

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The teat-cleaning device also includes a retracting member 70, see Fig 1, arranged for retracting the teat-cleaning member 2 from the teats of the animal after the cleaning operation is finished. The retracting member 70 includes a
30 cylinder 71 with a piston driven by the supply of a pressurised medium or by the application of a sub-atmospheric pressure. The piston 72 is connected to a wire-like member 73, e.g. in the form of a line, a rope, a wire or a chain, which is connected to the teat-cleaning member
35 2. By moving the piston rearwards the teat-cleaning cups 5 can then be withdrawn from the teats in a convenient manner.

It is to be noted that the retracting function of the retracting member could also be incorporated in the balancing member 48.

5 In a simplified embodiment of the invention, the first conduit member 1 may include a bundle of supply conduits and discharge conduits. In this case, each such supply conduit is connected to or forms a single conduit together with a respective second supply conduit 13 of the second conduit member 7. Moreover, each such discharge conduit is connected to or forms a single conduit together with a respective second discharge conduit 14 of the second conduit member 7. In this case, the conduit assembly 6 may also include a connection member, which is arranged to hold the bundle of conduits together. Such a connection member may also possibly include the grip member 33 and the handle 34. In this case the connection member may be shaped as a band, a ring or any similar member extending around the bundle of conduits.

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The present invention is not limited to the embodiments disclosed but may be varied and modified within the scope of the following claims.

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Claims

1. A device for cleaning the teats of an animal, including a first conduit member (1) and a teat-cleaning member (2),
5 which via the first conduit member (1) is connectable to a central arrangement (3) for supplying cleaning liquid and discharging waste liquid,
characterised in
that the teat-cleaning member (2) includes at least two
10 teat-cleaning cups (5) to be applied to a respective teat of the animal, a conduit assembly (6) and two second conduit members (7) extending between a respective one of the teat-cleaning cups (5) and the conduit assembly (6), and
that each teat-cleaning cup (5) is connected to the central
15 arrangement (3) via the respective second conduit member (7) and the first conduit member (1) for said supply of cleaning liquid and said discharge of waste liquid.
2. A device according to claim 1, characterised in that
20 the central arrangement (3) is arranged to discharge the waste liquid by applying a pressure significantly lower than the atmospheric pressure to the teat-cleaning cups (5) via the conduit members (1, 7).
- 25 3. A device according to any one of claims 1 and 2, characterised in that each conduit member (1, 7) includes a supply conduit (11, 13) for the supply of the cleaning liquid to said teat-cleaning cup (5), and a discharge conduit (12, 14) for the discharge of waste liquid from said
30 teat-cleaning cup (5).
4. A device according to claims 2 and 3, characterised in that the central arrangement (3) is arranged to perform the supply of cleaning liquid and the discharge of waste liquid
35 simultaneously.

5. A device according to any one of the preceding claims, characterised in that the conduit assembly includes a connection member (6'), which connects each second conduit member (7) to the first conduit member (1).

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6. A device according to claims 3 and 5, characterised in that the supply conduit (13) of each second conduit member (7) is connected to the supply conduit (11) of the first conduit member (1), and that the discharge conduit (14) of each second conduit member (7) is connected to the discharge conduit (12) of the first conduit member (1).

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7. A device according to any one of claims 1-4, characterised in that the conduit assembly includes a connection member arranged to hold the conduit members (1, 7) together.

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8. A device according to any one of the preceding claims, characterised in that the teat-cleaning member (2) includes a casing (30) enclosing the connection member (6') and having a first opening (31) for the passage of the first conduit member (1) and at least two second openings (32) for the passage of a respective one of the second conduit members (7).

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9. A device according to any one of the preceding claims, characterised in that each second conduit member (7) is relatively rigid permitting the second conduit member (7) and the associated teat-cleaning cup (5) to extend in an upward direction (x).

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10. A device according to any one of the preceding claims, characterised in that the teat-cleaning member (2) includes a grip member (33) permitting holding of the teat-cleaning member.

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11. A device according to claims 8 and 10, characterised in that the grip member (33) is provided on the casing (30).

5 12. A device according to any one of the preceding claims, characterised in that the device includes a carrying arrangement (40) for carrying the teat-cleaning member (2) to be movable between at least an inactive position (A) beside the animal to be cleaned and an active position (B) beneath the teats of the animal.

10 13. A device according to claim 12, characterised in that the carrying arrangement (40) includes at least one rail (41) and a carriage (42) movable along the rail (41), wherein the teat-cleaning (2) member is suspended in the
15 carriage (42) via a wire-like member (44).

14. A device according to claim 13, characterised in that the carrying arrangement (40) includes at least one holding member (46) for holding the first conduit member (1) along
20 the wire-like member (44) and the carriage (42).

15. A device according to claim 14, characterised in that said holding member (46) forms an open passage through which the first conduit member (1) is movable.

25 16. A device according to any one of claims 13 to 15, characterised in that the device includes a balancing member (48) enabling the teat-cleaning member (2) to be raised and lowered by the application of a force smaller than the
30 gravity force of the teat-cleaning member (2) proper.

17. A device according to claim 16, characterised in that the balancing member (48) is provided on the carriage (42).

18. A device according to any one of claims 16 and 17, characterised in that the balancing member (48) is arranged to collect the wire-like member (44).

5 19. A device according any one of the preceding claims, characterised in that each teat-cleaning cup (2) includes a lower end (52), an upper end (53) and an inner space (54), the upper end defining an opening (55) for the introduction of the teat to be cleaned into the inner space.

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20. A device according to claim 19, characterised in that each teat-cleaning cup (5) includes a flexible lip (60) extending around the opening (55) and inwardly towards a centre of the opening in order to abut tightly the teat
15 introduced into the inner space (54) of the teat-cleaning cup (5).

21. A device according to claim 20, characterised in that the lip (60) slopes downwards towards the centre of the
20 opening (55).

22. A device according to any one of the preceding claims, characterised in that the teat-cleaning device includes a retracting member (70) arranged for retracting the teat-
25 cleaning member (2) from the teats of the animal after the cleaning operation is finished.

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Abstract

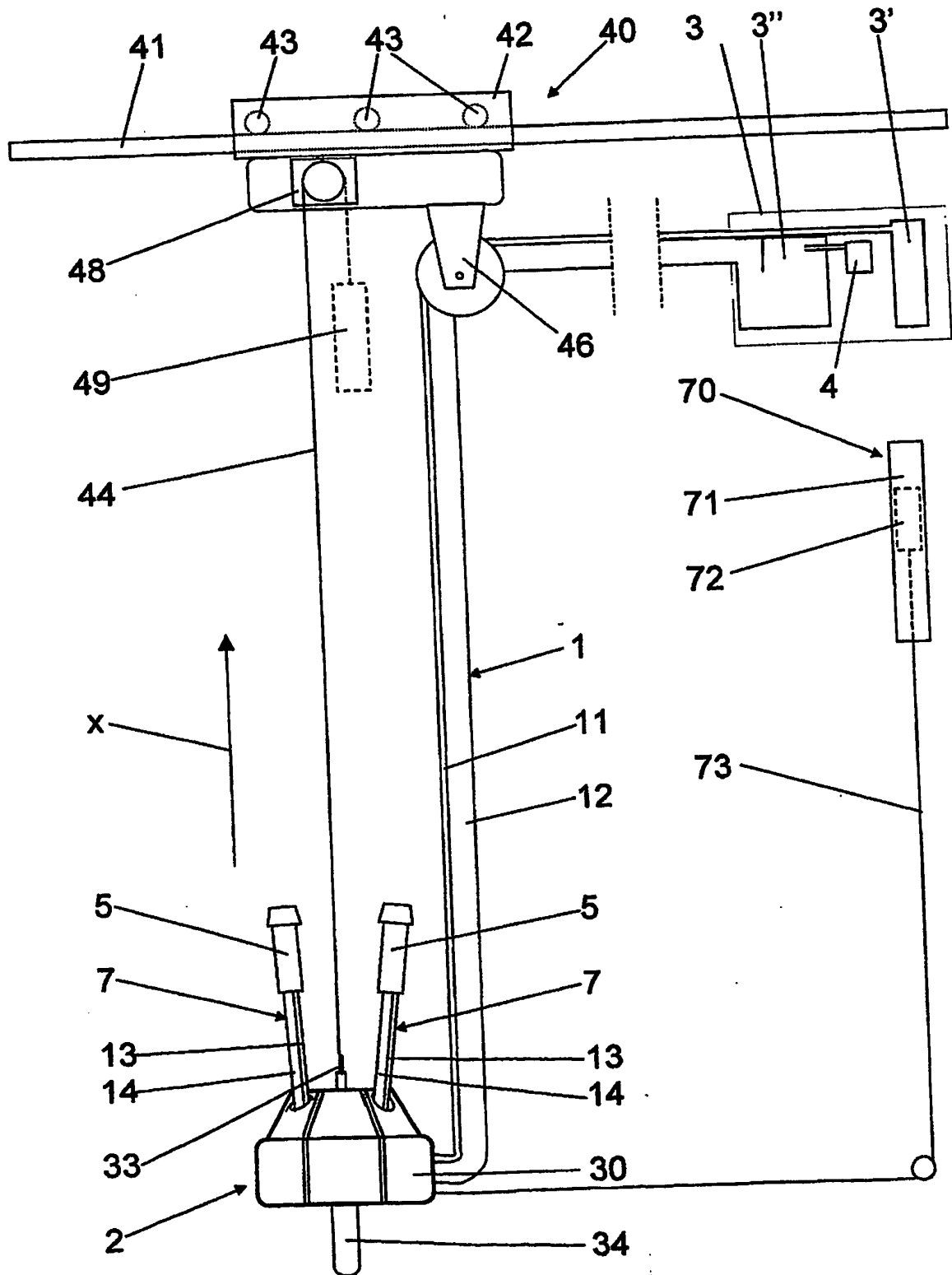
The invention refers to a device for cleaning the teats of an animal. The device includes a first conduit member (1) and a teat-cleaning member (2), which via the first conduit member is connectable to a central arrangement (3) for supplying cleaning liquid and discharging waste liquid. The teat-cleaning member (2) includes at least two teat-cleaning cups (5) to be applied to a respective teat of the animal, a conduit assembly and two second conduit members (7) extending between a respective one of the teat-cleaning cups and the conduit assembly. Each teat-cleaning cup (5) is connected to the central arrangement (3) via the respective second conduit member (7) and the first conduit member (1) for the supply of cleaning liquid and the discharge of waste liquid.

20 (Fig. 1)

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Fig 1



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Fig 2

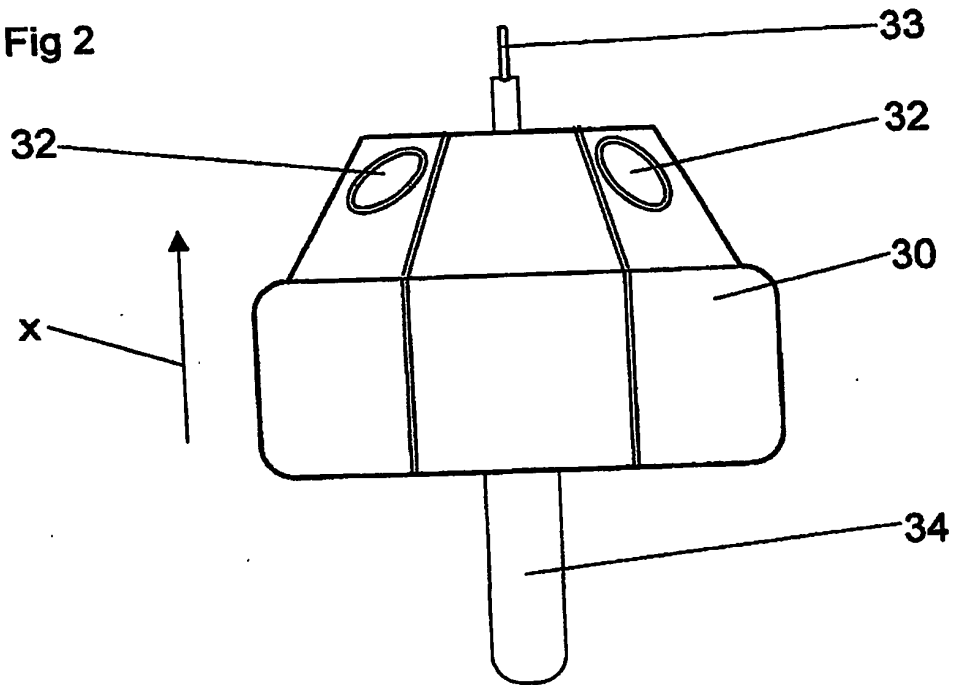
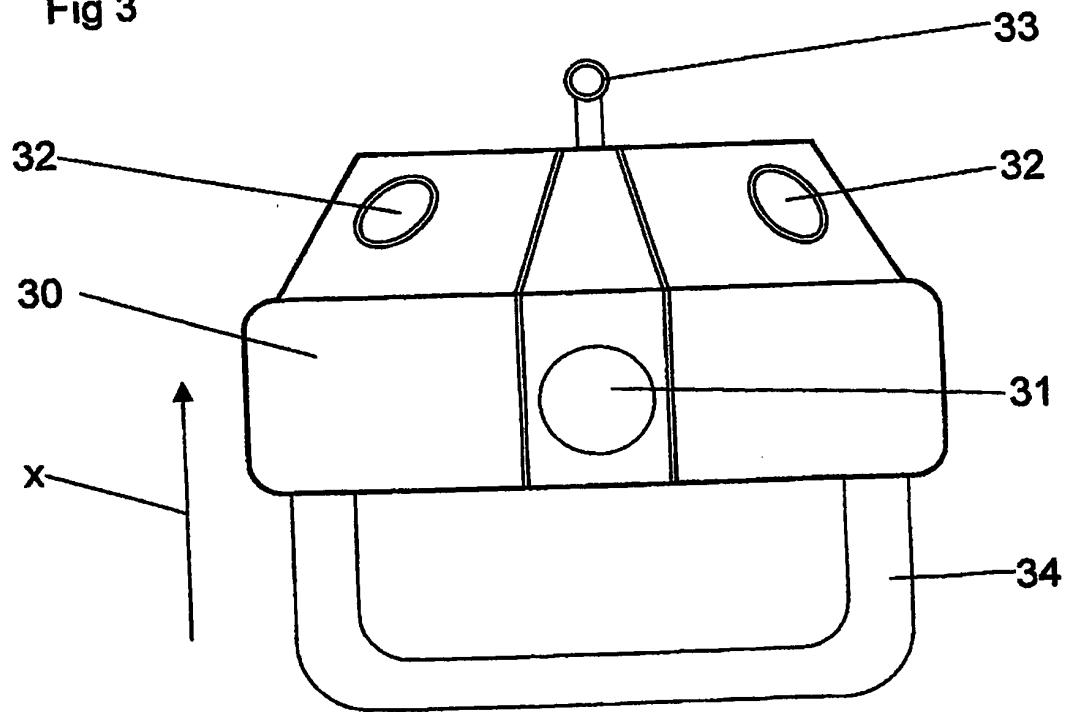


Fig 3



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Fig 4

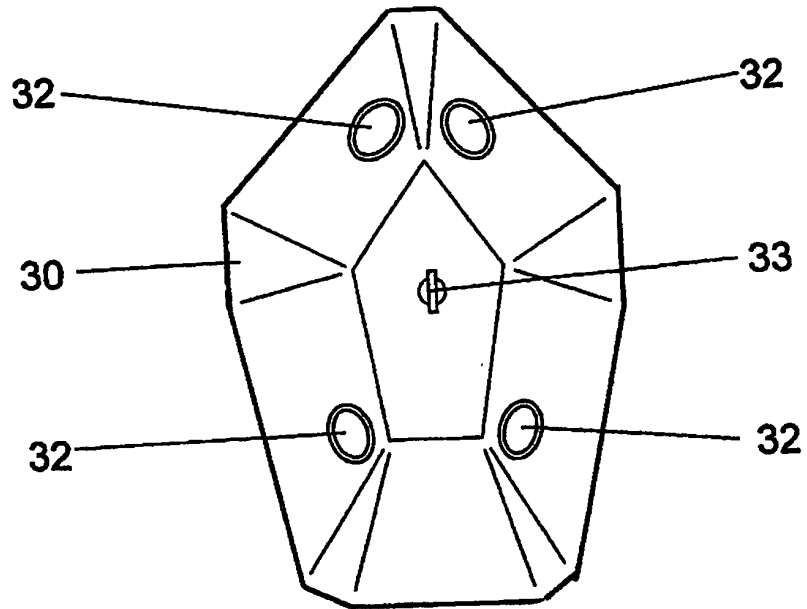


Fig 5

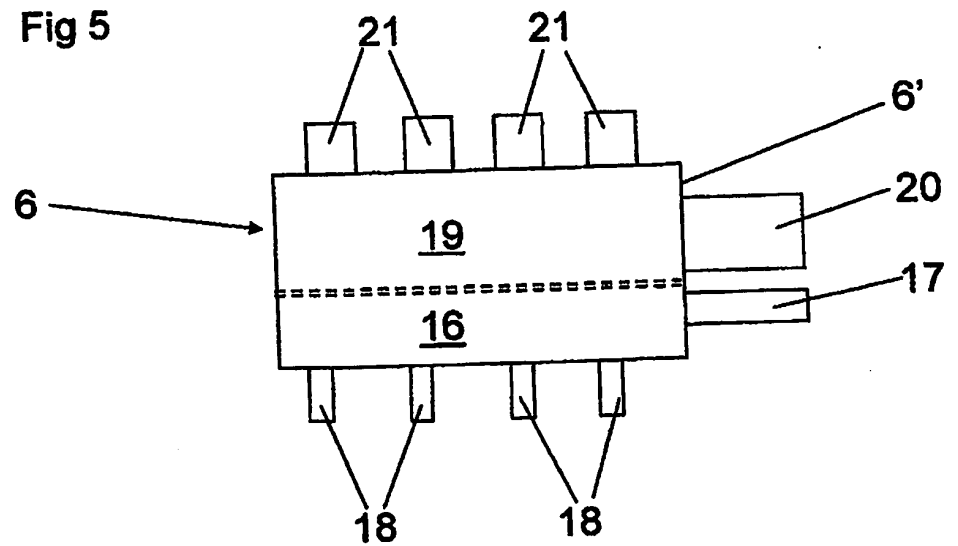
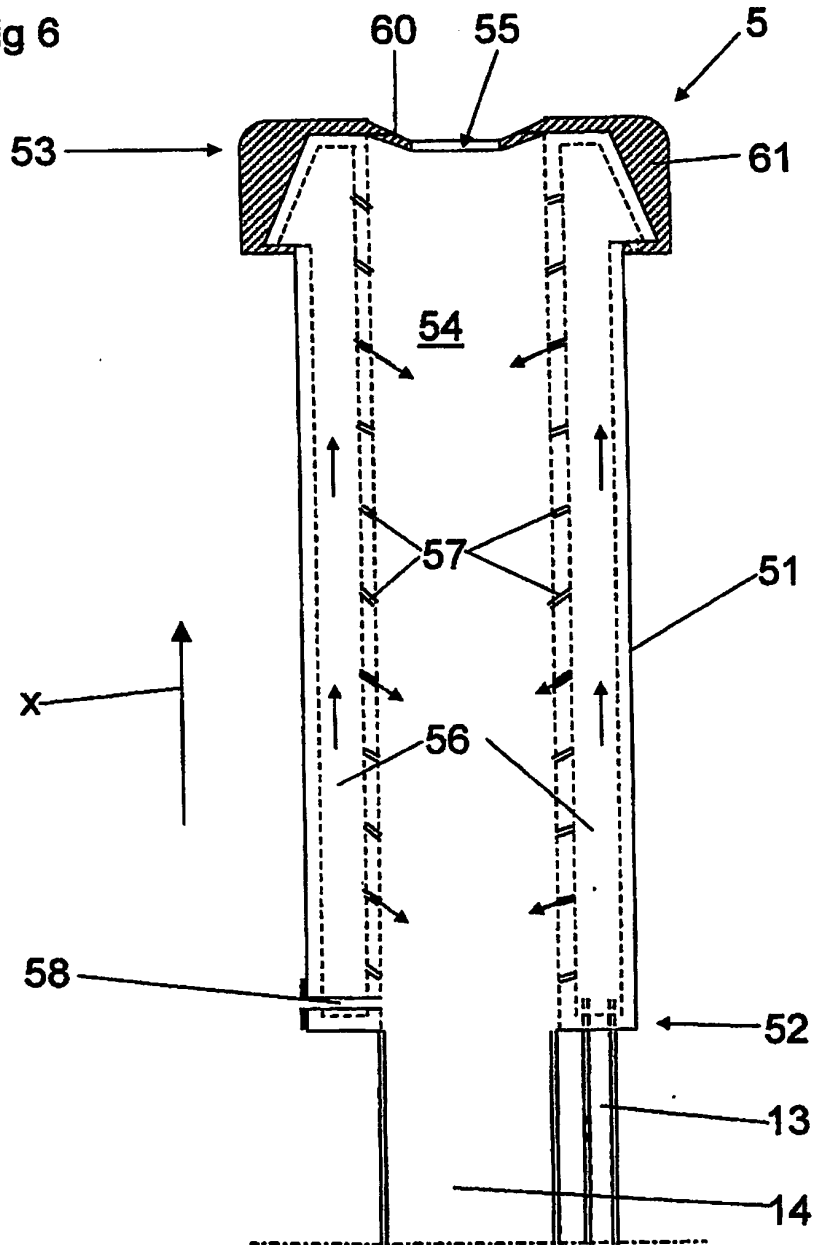


Fig 6



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Fig 7

